e2v

ELIIXA+ 16k Pixels
Cmos Line Scan Camera

Datasheet - *Preliminary*

1 Features

- Cmos Sensor 4x 16384 Pixels, 5 x 5µm
- Multi-Line structure (1, 2 or 4 lines to adapt the sensitivity)
- Interface :
  - Full CameraLink® (4, 8 or 10 Channels), 85MHz each
  - CoaXPress® (4x Links)
- Line Rate :
  - Up to 50000 l/s In CameraLink®
  - Up to 100000 l/s in CoaXPress®
- Data Rate :
  - Up to 850 MB/s In CameraLink®
  - Up to 1,6GB/s in CoaXPress®

Bit Depth : 8, 10 or 12bits

- Vertical and Horizontal Binning
- Flat Field Correction
- Look Up Table
- Low Power Consumption : <13W
- Compliant with Standard Lenses of the Market

2 Description

e2v's next generation of line scan cameras are setting new, high standards for line rate and image quality.
Thanks to e2v's recently developed multi line CMOS technology, the camera provides an unmatched 100 000 lines/s in a 16k pixel format and combines high response with an extremely low noise level; this delivers high signal to noise ratio even when short integration times are required or when illumination is limited. The 5µm pixel size is arranged in four active lines, ensuring optimal spatial resolution in both scanning and sensor directions with off-the-shelf lenses. An outstanding data rate in excess of 1.6 Gpixels per second, delivered via a new CoaXPress interface, allows for extremely high throughput and opens up an array of new possibilities for the next generation of inspection systems for demanding applications such as flat panel display, PCB and solar cell inspection.

3 Application

- Flat Panel Display Inspection
- PCB Inspection
- Solar Cell Inspection
- Glass Inspection
- Print Inspection

GEN<i>CAM

CAMERA Link® REGISTERED PRODUCT

CoaXPress

4 Standard Conformity

The ELIIXA+ cameras have been tested using the following equipment:

- A shielded power supply cable
- A Camera Link data transfer cable ref. 14B26-SZLB-500-OLC (3M)
- A linear AC-DC power supply

e2v recommends using the same configuration to ensure the compliance with the following standards.

4.1 CE Conformity

The ELIIXA+ cameras comply with the requirements of the EMC (European) directive 89/336/CEE (EN 50081-2, EN 61000-6-2).

4.2 FCC Conformity

The ELIIXA+ cameras further comply with Part 15 of the FCC rules, which states that: Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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5 Key Specifications

Characteristics	Value	Unit
Sensor Characteristics		
Resolution	4 x 16384	Pixels
Pixel Size (square)	5	µm
Max Line Rate CoaXPress® 4x Links (8 or 10bits) CoaXPress® 4x Links (12 bits) CameraLink® 10xTaps Full+ mode (8 bits) CameraLink® 8xTaps Full mode (8 bits) CameraLink® 4xTaps Medium mode (8 or 12 bits)	 100 40 50 40 20	 kHz kHz kHz kHz kHz
Radiometric Performances (at Maximum Pixel rate and Minimum Camera Gain)		
Bit Depth	8 10 (CoaXPress® only) 12	Bits Bits Bits
Responsivity	450	LSB 12bits/(nJ/cm2)
Response non linearity (between 5 – 95% saturation)	<1	%
Maximum PRNU	3	%
Dynamic Range	73	dB
Functionalities (Programmable via Control Interface)		
Sensor Modes	Multi-lines 1 , 2 and 4 (16k pixels) Binning 1 or 2 lines (8k pixels)	-
Gain (Analog : In the ADC converter)	Up to 12	dB
Offset	-4096 to +4095	LSB
Trigger Mode	Timed (Free run) and triggered (Ext Trig, Ext ITC) modes	
Mechanical and Electrical Interface		
Power Supply	Single 12 to 24	V_{DC}
Power Consumption CameraLink® CoaXPress®	 <13 <16	 W W
Lens Mount	M95	-
Sensor Alignment	±100	µm
Sensor Flatness	±35	µm
General Features		
Operating Temperature	0 to 55 Front Face	°C
Storage Temperature	-40 to 70	°C
Regulatory	CE, FCC and RoHs Compliant	-

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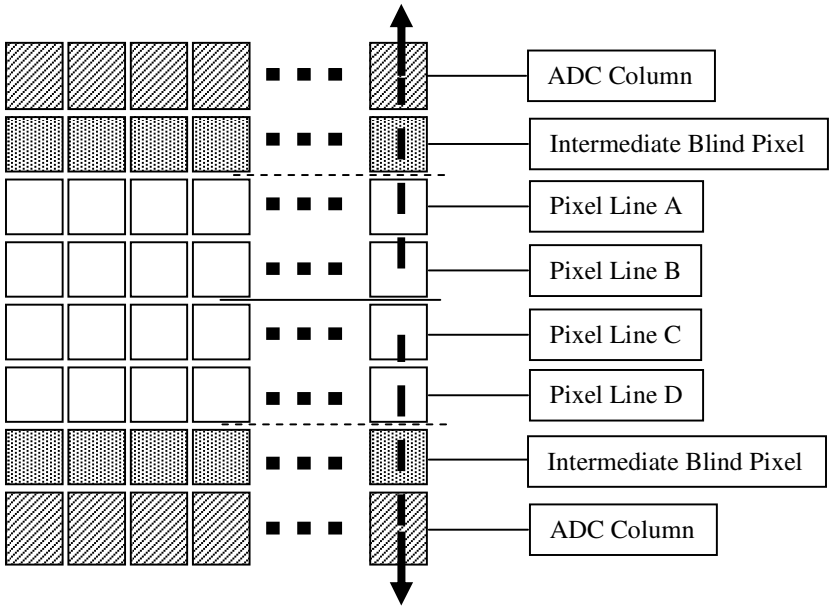
6 Camera Description

6.1 Image Sensor

The Eliixa+ 16k sensor is composed of two pairs of sensitive lines. Each pair of lines use the same Analog to Digital Column converter (ADC Column). An appropriate (embedded) Time delay in the exposure between each line this allows to combine two successive exposures in order to double the sensitivity of a single line.

This Time Delay Exposure is used only in the 4S multi-line modes (4 Lines) and also in the two binning modes, as described below.

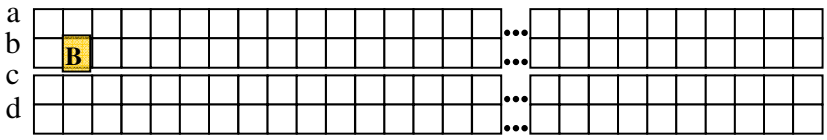
The 16384 Pixels of the whole sensor are divided in 4 blocks of 4096 pixels.



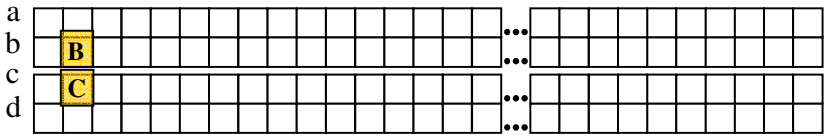
6.2 Multi-Lines modes and Binning

Multi-Lines Modes *(16k Pixels Output)*

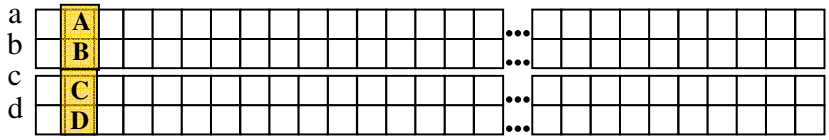
Mode 1S = B



Mode 2S = B+C (FPGA)

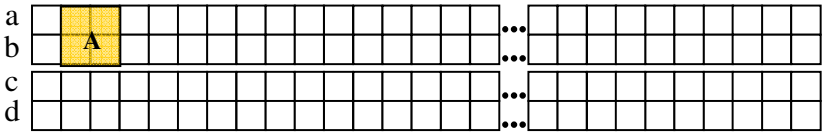


Mode 4S = (A+B)+(C+D)

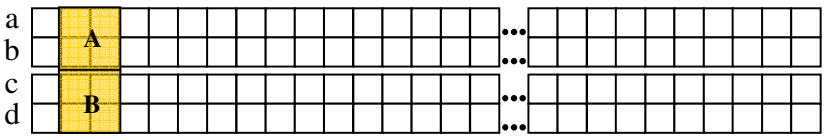


Binning Modes *(8k pixels output)*

Mode 1SB = A



Mode 2SB = A+B (FPGA)



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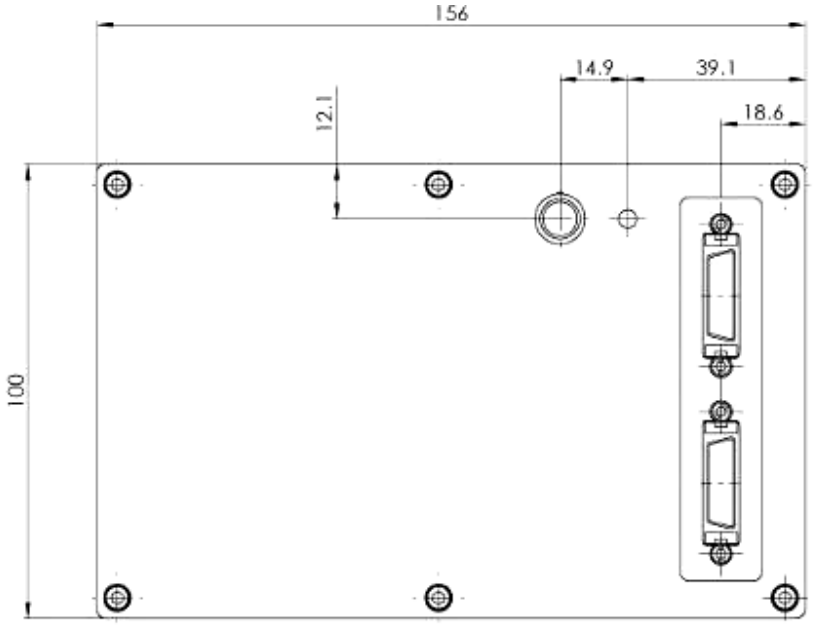
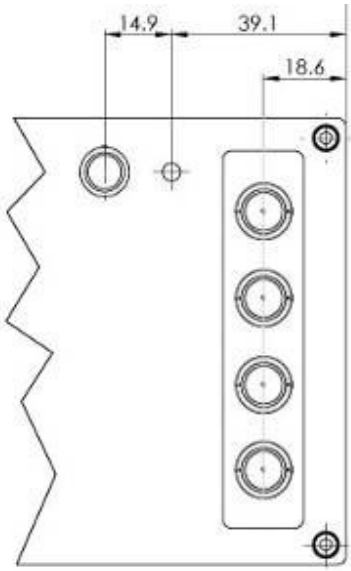
7 Camera Interface

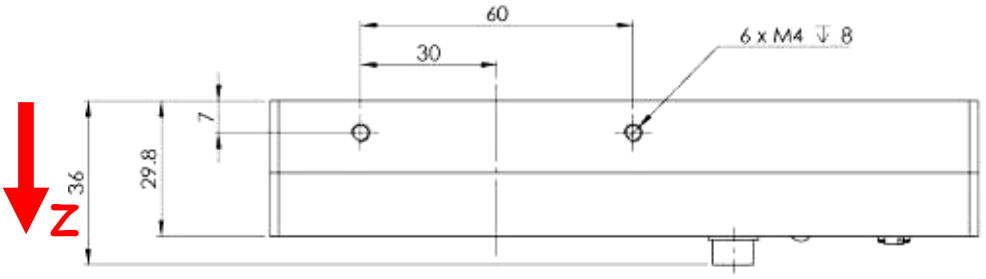
7.1 Mechanical Drawings

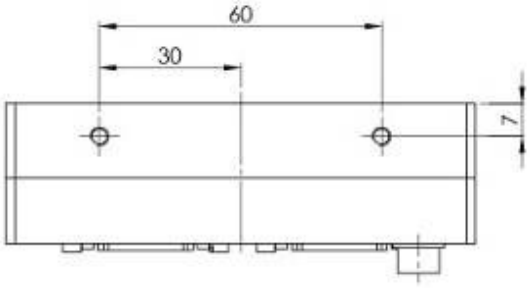


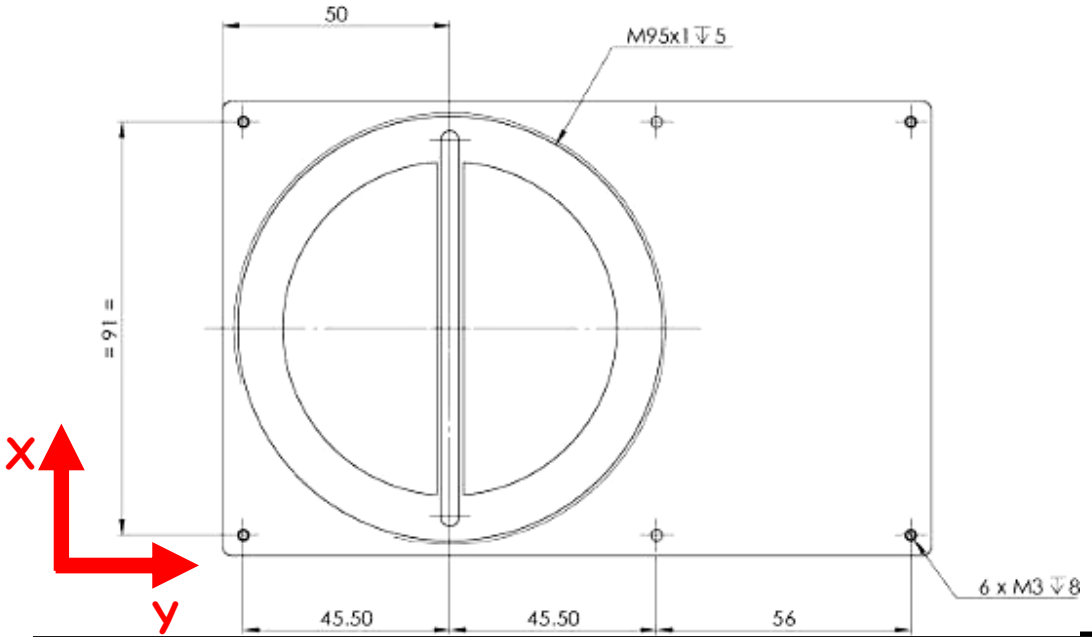
Camera Link



CoaxPress







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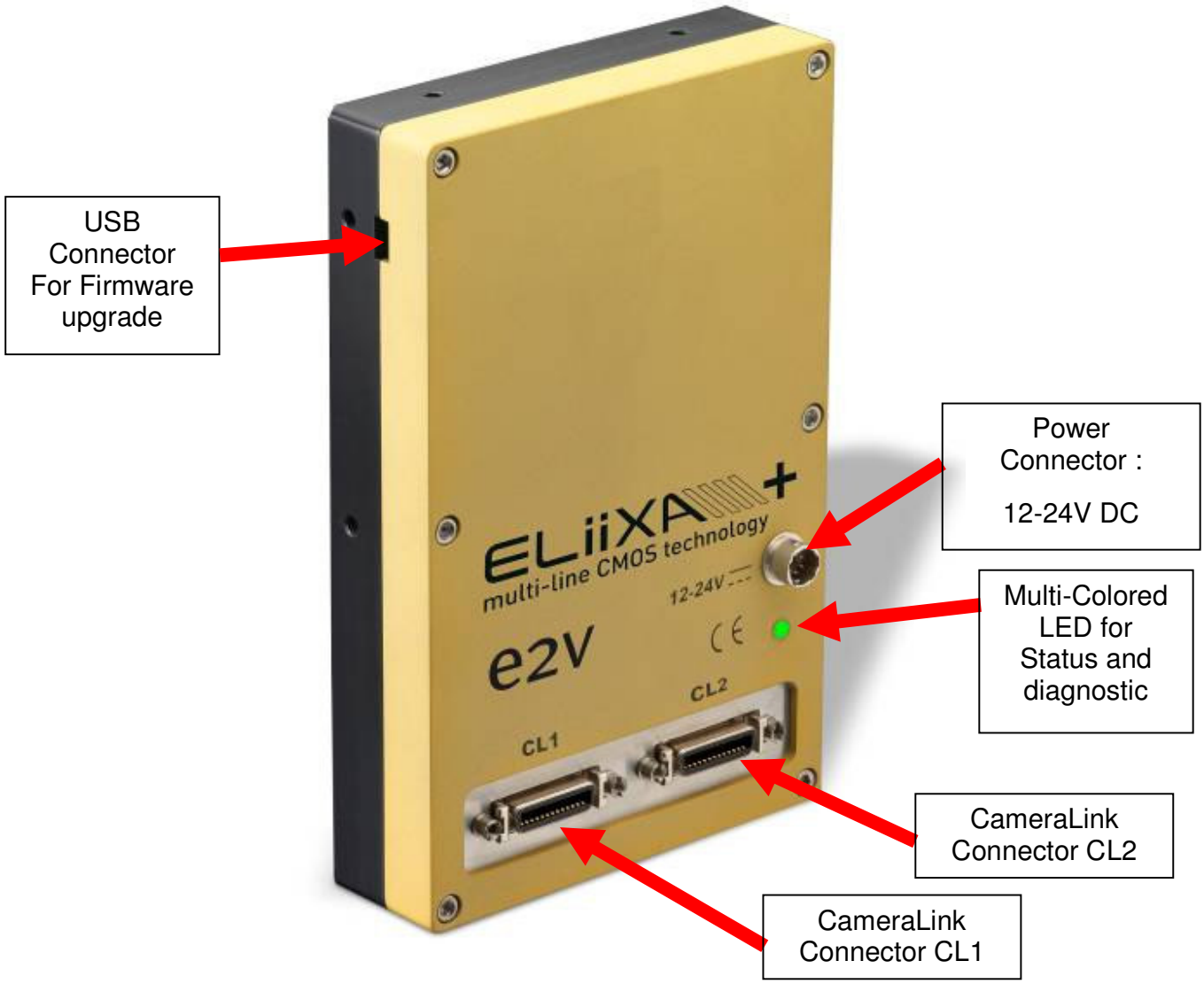
7.2 Sensor Positioning

Sensor alignment		
X	9 ±0,1	mm
Y	50 ±0,1	mm
Z	-9,4 ±0,15	mm
Planarity	±35	µm
Rotation (X,Y plan)	±0,2	°
Tilt (versus lens mounting plane)	±35	µm

7.3 Input/Output Connectors and LED (CameraLink)



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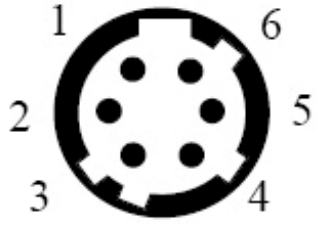
7.3.1 Status LED Behaviour

After less than 2 seconds of power establishment, the LED first lights up in ORANGE. Then after a Maximum of 30 seconds, the LED must turn in a following colour :

Colour and state	Meaning
Green and continuous	OK
Green and blinking slowly	Waiting for Ext Trig (Trig1 and/or Trig2)
Red and continuous	Camera out of order : Internal firmware error

7.3.2 Power Connector (CameraLink)

Camera connector type: Hirose HR10A-7R-6PB (male)
Cable connector type: Hirose HR10A-7P-6S (female)



Camera side description

Signal	Pin	Signal	Pin
PWR	1	GND	4
PWR	2	GND	5
PWR	3	GND	6

Power supply from 12 to 24v
Power 13W max with an typical inrush current peak of 2,8A(*) during power up

(*) temporary value : Applicable for Prototypes only

Typical values	Current consumption	
Camera	**12V**	**24V**
ELIIXA+ 16k CL	0,9A	0,45A

Power up Time : Around 30s

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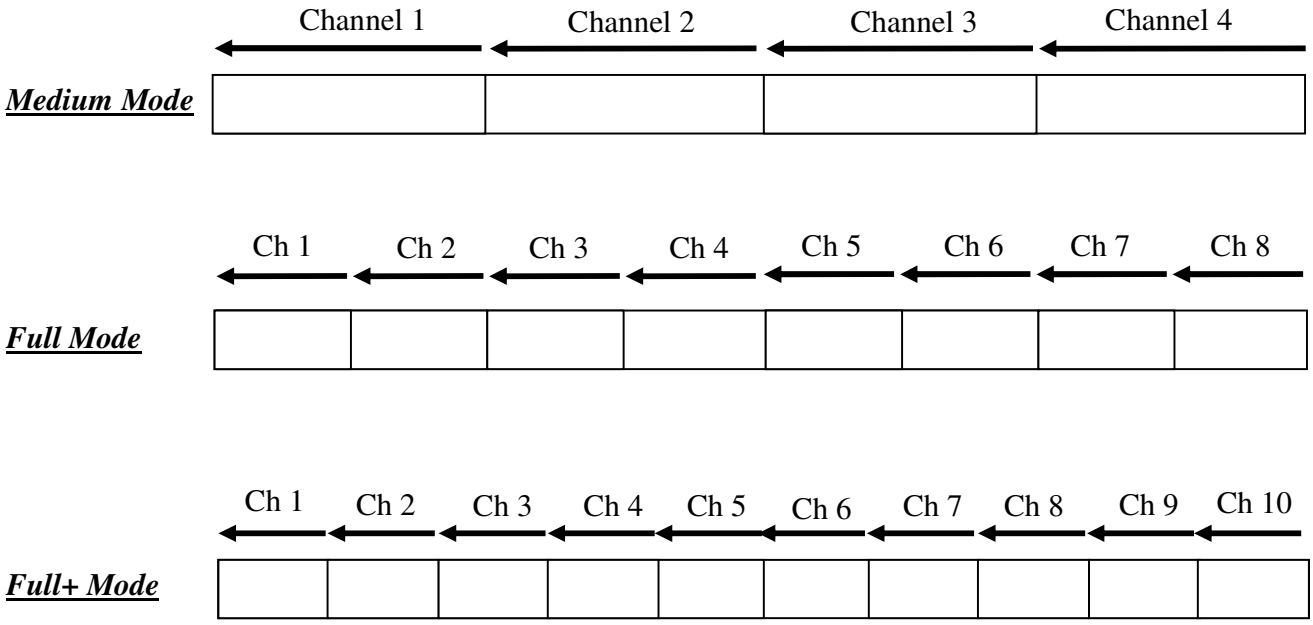
7.3.3 Output Configuration (CameraLink)

Medium CameraLink Mode	Connector CL1 + CL2
4 Channels 8bits	4 x 85MHz
4 Channels 12bits	4 x 85MHz
Full CameraLink Mode	**Connector CL1 + CL2**
8 Channels 8bits	8 x 85MHz
Full + CameraLink Mode	**Connector CL1 + CL2**
10 Channels 8bits	10 x 85MHz



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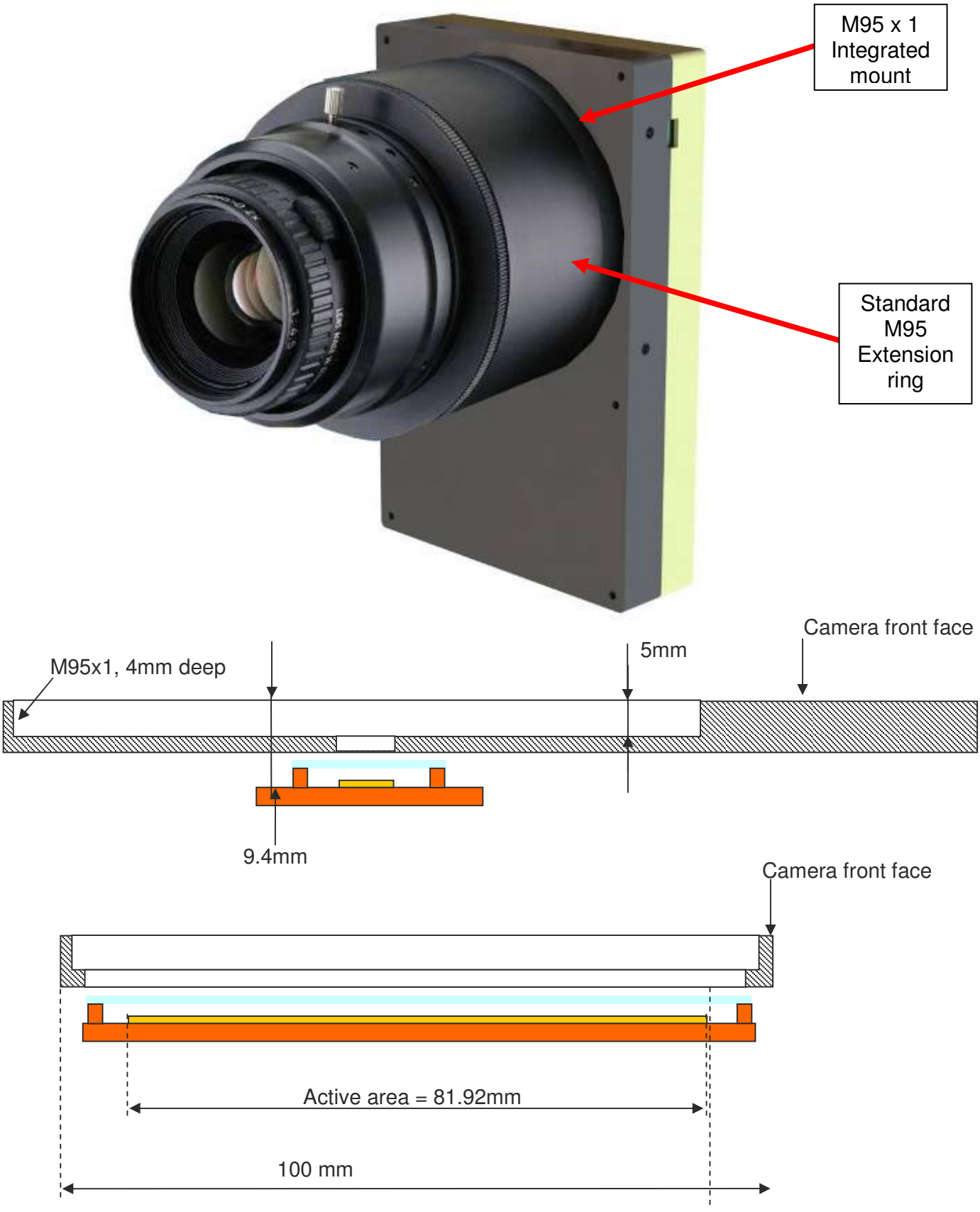
7.4 Optical Interface



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Compliant Lenses

QIOPTICS (LINOS)

	Nominal Magnification	Magnification Range	M95 Focus tube Reference	Lens Reference Part number
Inspec.x. L 5.6/105	0,33 X	0,25 – 0,45 X	2408-012-000-41	0703-085-000-20
Inspec.x. L 5.6/105	0,5 X	0,4 – 0,65 X	2408-012-000-41	0703-084-000-20
Inspec.x. L 5.6/105	0,87 X	0,6 – 0,9 X	2408-012-000-43	0703-083-000-20
Inspec.x. L 5.6/105	1 X	0,85 – 1,2 X	2408-012-000-43	0703-082-000-20
Inspec.x. L 4/105	3 X	2,8 – 3,3 X	2408-012-000-46	0703-104-000-20
Inspec.x. L 4/105	3,5 X	3,3 – 3,7 X	2408-012-000-44	0703-095-000-21
Inspec.x. L 3.5/105	5 X	4,8 – 5,2 X	2408-012-000-45	0703-102-000-20

SCHNEIDER KREUZNACH

	Nominal Magnification	Magnification Range	Working Distance (at nom. Mag.)	Reference Part number
SR 5.6/120-0058	1 X	0,88 – 1,13 X	212 mm	1002647
SR 5.6/120-0059	0,75 X	0,63 – 0,88 X	252 mm	1002648
SR 5.6/120-0060	0,5 X	0,38 – 0,63 X	333 mm	1002650
SR 5.6/120-0061	0,33 X	0,26 – 0,38 X	453 mm	1004611

Accessories	V mount 25mm macro-extension tube	Necessary to combine the whole lens system	20179
	V mount to Leica adapter		20054
	Unifoc 76		13048
	Adapter M58x0.75 – M95x1		1062891
	Extension tube M95x1, 25mm	To be combined to reach the appropriate magnification	1062892
	Extension tube M95x1, 50mm		1062893
	Extension tube M95x1, 100mm		1062894

EDMUND OPTICS

	Nominal Magnification	Working Distance (at nom. Mag.)	Reference Part number
TechSpec F4	1 X	151 mm	NT68-222
TechSpec F4	1,33 X	158,5 mm	NT68-223
TechSpec F4	2,0 X	129 mm	NT68-224
TechSpec F4	3,0 X	110 mm	NT68-225

Accessories	Large Format Tip/Tilt Bolt Pattern Adapter, 2X	NT69-235
	Large Format Focusing Module	NT69-240
	Large Format Adapter Set	NT69-241

NAVITAR

Raptar Pro 4/86	Magnification : 1 X	Extension Tubes on request	1 - 17494

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7.5 Camera Models

Camera Part Number	Details
EV71YC4MCP1605-BA0	16k Pixels CoaXPress®
EV71YC4MCL1605-BA0	16k Pixels CameraLink®

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